Smith, John
Notes on dental surgery.

NOTES ON

DENTAL SURGERY

INTENDED FOR

Students of Medicine and Medical Practitioners.

BY

J. SMITH, M.D., LL.D., F.R.C.S.E.,

Surgeon Dentist to the Queen in Scotland, etc.

NOTES ON DENTAL SURGERY.

CHAPTER I.

THE following pages are intended for students of medicine and medical practitioners, as an abridgment of the elementary principles of dental surgery, with as much practical information as might enable some of the more common operations in that department to be performed, if not with the artistic skill of the expert, at least in a manner that in many emergencies would be satisfactory and beneficial.

The importance of a larger provision being made for the treatment of dental diseases has of late occupied a considerable amount of attention. Whether the supply of specialists in this line, or the increased institution of public dental appointments may yet meet the exigencies of the occasion, is difficult to foresee, but there seems little doubt that an acquaintance with the subject by medical men, in a greater measure than at present prevails, might be of considerable advantage.

The chapters are arranged somewhat in the same manner as in a previous and larger work by the author, from which he has quoted some portions given here, viz., "A Handbook of Dental Anatomy and Surgery," the last edition of which was published in 1871, but is now apparently out of print. The "Notes," however, must be considered more as a compilation of memoranda than as anything like a treatise upon the subject.

GENERAL CHARACTERS OF THE TEETH IN MAN.

In undertaking the treatment of dental diseases, it is essential that the practitioner should be familiar with the

number, arrangement, and form of the teeth in man. Anatomists consider forty-four to be the so-called typical number of teeth in the mammalia. In man the number of the adult complement of teeth is thirty-two. It is therefore held that in man, as is the case in some other animals, certain teeth are suppressed; forty-four ought, as it were, to be present, but in man twelve of these are suppressed, reducing the number to thirty-two. This diminution of the typical number of teeth in man affords one explanation of the occurrence of what is sometimes believed to be a third dentition—as well as the existence of supernumerary teeth in the mouth—such unusual numbers, in both cases, indicating a return to the original or typical number which had been departed from.

These thirty-two teeth are arranged in the same way in both the upper and lower jaw—sixteen in each. In front, above and below, are four cutting teeth, flat at their edges, and termed incisors. Bounding these, on each side, is the canine or eye-tooth. Behind the canine are two teeth, termed bicuspids, or small grinders—two on each side, above and below. Behind these again are three large grinders, or the true molar teeth—three on each side, above and below. These three true molar teeth appear only with the permanent set. The first or milk set differs from the second or permanent set in being twelve teeth fewer—six above and six below; the milk set being only twenty in number instead of thirty-two, and the difference consisting in the absence of any direct predecessors to the true molar teeth.

In man the teeth are all of one length, all on the same level at the crowns, and no interspaces exist among them, every tooth being close to the one next it. The existence of unoccupied spaces among the teeth of the lower animals may explain why they suffer so much less during dentition or teething than man, where the jaw is barely, if it is actually, sufficient to contain the teeth with which it is furnished.

Each tooth is composed of three different substances, viz. —1st, a body or base, composed of dentine; 2d, a cap, investing the crown, and termed enamel; 3d, a substance coating that, and termed cement.

The character of root or fang in each tooth is one of the chief marks by which they are distinguished from each other. The natural form of root in all the incisor teeth, above and

below, is a single, straight, conical fang. In the canine teeth the same form is observed. In the bicuspids of the lower jaw the single root continues, but in those of the upper jaw it inclines to divide into two fangs. In all the upper molars the number of fangs is three; two outside, and one next the palate. In all the lower molars the number of the fangs is two, one behind the other.

A knowledge of the number, form, and direction of these fangs is essential for performance of tooth extraction, as a tooth is extracted with much more rapidity and greater ease by attention to its form and mode of fixation.

The first appearance of the teeth takes place about the seventh or eighth month of infancy, with the eruption of the temporary or milk set. As soon as the crown of the still unseen tooth is completed, and long before the root is perfect, it is "cut," as it is called. This takes place, not by the tooth forcing a way for itself through the gum and other tissues, but by these tissues themselves making a way for its escape. An opening is, if we may so speak, spontaneouly formed for it; the tooth protrudes through this opening, and to a certain extent the tooth is hoisted a little way out of the gum. This lifting up of the young tooth, on its first penetrating the gum, causes it to appear to grow more rapidly than it really does, —such apparent rapidity of growth during the first few days of a tooth's existence in the mouth being, however, deceptive.

This, in general terms, constitutes that strictly natural and healthy process going on in infant life, and termed "teething," not a step in which is to be regarded as disease. Dentition may, like every other natural process, assume a diseased or morbid condition, but in no ordinary case does it deserve the bad character generally assigned it.

The first or temporary set is soon lost and replaced by others which are to be renewed no more—the permanent or adult teeth. The various steps by which this second dentition is effected closely resemble those of the first, and it might be tedious to enter upon the physiology of the process in either case. The main difference is that the majority of the teeth in the second or permanent set have had predecessors among those of the first set; they form, as it were, a second crop, and this second crop is much longer in coming to perfection than the first was; inasmuch as within three years after birth all

the first crop had appeared above ground, whereas the second is not all up for close upon twenty years more, during nearly all which time one or other of its members has been in process of growth.

The time at which the various teeth of the first and second dentition are "cut" varies considerably. The earliest teeth to appear above the gum in the first or temporary set are the lower central incisors. This takes place about the seventh or eighth month of infant life In a week or two those of the upper jaw succeed them The lateral incisors of the upper jaw next appear about the eighth or ninth month, and those of the lower jaw quickly follow. The anterior lower molars are cut from the twelfth to the sixteenth month, and immediately after them come the corresponding teeth in the upper jaw. During the seventeenth or eighteenth month the canines appear, generally those in the upper jaw first, and before the age of two and a half years the second milk molars generally commence to make their appearance, thus completing the temporary set of teeth.

The second set generally begins to appear about the age of seven years, by the first permanent molars being then cut. These are followed by the permanent central incisors before eight, the lateral incisors about nine, the first bicuspids at ten, the second at eleven, the canines at twelve, the second molars at thirteen, and the third molars at twenty or twenty-one years of age, or about these dates as a general rule.

The structure of the three substances mentioned as entering into the formation of a tooth is peculiar, and all of them are different from each other.

Dentine, or the body of the tooth, is composed of excessively minute tubes, the walls of which consist of something like bone. These tubes are arranged so as to lie with one end opening at the centre of the tooth, the other terminating at its external surface. The use of them seems to be in maintaining the vitality of the tooth, by drawing nourishment from the vessels running along its central cavity and perhaps they serve to endow the dentine with a certain amount of sensitiveness.

Enamel consists of a collection of minute, dense, and excessively hard columns, closely packed together, and standing upon the surface of the dentine, where that substance is ex-

posed within the mouth, and for which they constitute merely a mechanically protective covering.

Cement is a substance closely resembling ordinary bone, and acts in the double capacity of assisting the central cavity of the tooth in affording nourishment to the dentine, and as a bond of union between the root of the tooth and its socket. The cement is more largely furnished with the means of deriving a supply of nourishment from the adjoining blood-vessels than the dentine; and, as the centre of the tooth and the surface of its fang are thus provided with the means of sustenance, its vital powers are sufficiently, although feebly, maintained.

Wherever any of these three substances are defective, they are, owing to the small amount of life at best possessed by them, more prone to disease and destruction. In their healthy condition nature has provided against the trying circumstances these organs are necessarily exposed to in such a locality as the mouth; but where any imperfection or disordered condition exists in the component hard structures of a tooth, the combined effect of this, and all the agencies to which it becomes exposed readily result in disease or death and subsequent decomposition or decay of its substance, constituting what is termed "dental caries." The substance of the tooth is destroyed, broken down, and removed; the central canal, largely supplied with nerves as well as blood-vessels, and the cement substance, also largely endowed with sensation, either or both become encroached upon; acute pain is the result, and toothache in its true form is produced.

CHAPTER II.

GENERAL ANATOMY OF THE MAXILLARY APPARATUS.

The anatomy of the dental system cannot be well described or thoroughly understood without taking into account the anatomy of all those structures which, besides the teeth, are involved in the performance of mastication. These structures include the bones entering into the formation of the upper and lower jaw, the muscles moving the lower jaw, the nerves and blood-vessels supplying these parts, and the integument covering them inside the mouth—a mere résumé or memorandum of which may be here appended.

Upper and Lower Maxillary Bones and Teeth.—What is termed the arch of the upper jaw is formed by the junction of two separate bones, one for each side, and termed the right and left superior maxillæ or maxillary bones. Each of these bones contains eight teeth in the adult subject, namely, one central incisor, one lateral incisor, one canine, two bicuspids, and three molars. These two bones articulate with each other in the middle line of the face, and from their large extent assist in the formation of the orbit, the nose, the cheeks, and the palate. The superior maxillary bone is very irregular in shape. It may be generally described as possessing an external surface—that upon which the cheek rests; an internal surface—that applied to the corresponding surface of the bone of the opposite side and other parts; and a posterior surface, forming the tuberosity which rounds off the bone behind. Above it presents a smooth flat surface, which forms part of the floor of the orbit. Below it presents an arched surface, entering into the formation of the palate, and having the upper teeth projecting downward from its external border. Partly inclosed by all these surfaces, a large hollow space exists in the body of the bone termed the maxillary antrum or antrum of Highmore. This cavity is of a triangular form, and its closure is completed by certain other bones entering into the forma-

tion of the skull. The superior maxillary bone gives passage to a branch of the fifth pair of nerves through a small round opening immediately under the orbit, and enters into the formation of the nose in conjunction with the same bone on the opposite side.

The lower jaw is formed by an arched or horse-shoe-shaped bone, termed the inferior maxilla or inferior maxillary bone. It is divided into a horizontal portion, containing the lower teeth, and an upright or ascending portion, terminating in the joint or temporo-maxillary articulation at each side. These portions are named respectively the horizontal and the ascending ramus of each side, the chin being considered as placed between them in front. The ascending ramus on each side is bounded superiorly by two structures, viz., in front by a sharp and thin process of bone termed the coronoid process, and behind by another process of a thick and somewhat tuberose aspect, termed the condyle, and constituting the articular portion of this bone. Between the coronoid process in front and the condyle behind, the flat substance of the ascending ramus is hollowed into a deep notch called the sigmoid notch. Proceeding downward, we find the internal aspect of the ascending ramus perforated by a canal opening downward into the substance of the bone. This is the inferior dental foramen for the transmission of a nerve and blood-vessels into the body of the bone for the supply of the contained teeth, etc. At its lower and back part, the angle formed by the commencement of the horizontal ramus is termed the angle of the jaw, and passing forward from this on each side to the chin is what has been already described as the horizontal ramus. Midway between the angle and the chin on each side is a small round opening—the mental foramen,—and marking the centre of the chin is a somewhat elevated ridge denominated the symphysis of the lower jaw.

Such, in general terms, and without entering upon any detailed description, are the more characteristic features of the upper and lower maxillæ.

The alveolar cavities or sockets in which the teeth are implanted in these bones, consist of a series of pits arranged along the free border of each jaw, and into which the fangs of the teeth are accurately fitted. This accuracy of fitting, along with the curved form assumed by the fangs, and the union

established by the membranous structures situated between them and the sockets, explain the remarkably firm manner in which the teeth are found fixed in the jaws.

Each alveolar cavity, whether for the single root of such teeth as those having only one fang, or for any one of the fangs of teeth having several, is inclosed by four walls, one situated toward the lips or cheeks, and one toward the tongue or palate, as the case may be, in the upper or lower jaw; and besides these, two transverse walls or partitions exist, separating each alveolar cavity from the others. All these walls are perforated by innumerable minute openings for the transmission of vessels, etc., to the outside of the fang, and at the deepest part of the sockets several larger openings exist for the entrance of the nerves and blood-vessels to the pulp cavities of the teeth. The transverse walls or partitions are much less dense in their structure than either the external or internal walls; and the external wall is in nearly all the teeth much thinner and weaker than in the internal one.

These peculiarities in the alveolar cavities are important to be kept in mind with reference to extraction of the contained teeth. The exact adaptation of the alveolar walls to the form of the fang lodged within them, especially when considered along with the curvature so generally assumed by these fangs, will at once indicate the impossibility of removing the teeth from their sockets by a straight pull. On the other hand, the thinness of the external alveolar wall, with the notable exception of the posterior molars of the lower jaw, coupled with the fact that, like the stones forming an arch, the fangs of all teeth are broadest on their outer aspect, indicates that a force ultimately applied so as to dislodge the teeth in an outward direction, will tend very materially to facilitate their removal. In the same manner, the soft and spongy texture of the tranverse partitions of the alveolar ridge renders it apparent how, in using the elevator or tooth-punch, a root or stump will be easily extruded, on these walls or partitions yielding before the power of such an instrument when properly directed. The disadvantages, again, attending an unacquaintance with such matters are too obvious to require any comment here.

The anatomical configuration of the teeth themselves, implanted in the upper and lower maxillæ, differs very much

among the individual members of the series, and according as they are temporary or permanent. The four incisors of the upper jaw are single-fanged teeth, and they differ from the corresponding teeth of the lower jaw, inasmuch as, while the upper ones have round fusiform fangs, the lower ones have the fang very much flattened from side to side. The eye-teeth, or canines, possess longer and stronger fangs than any of the other teeth. The form of these fangs is a somewhat flattened cone, frequently marked on the sides by a deep groove or furrow—a construction rendering their fixation in the jaw very secure. The bicuspids in the upper jaw—two in number on each side—have their fangs either single and very much flattened from side to side, or this flattening so pronounced in the middle as to divide the otherwise single fang longitudinally; thus leading to the tooth having two fangs—one externally and one internally—both in such cases being generally round and attenuated. In the lower jaw the corresponding teeth have simple round tapering fangs, sometimes of considerable length. The molar teeth of the upper differ in an important respect from those of the lower jaw. The upper molars have three fangs, the lower have only two. The three fangs of the upper molars are arranged so that two shall be situated next the cheek—one fang behind the other—and the third fang placed inside the others and directed toward the palate. In this manner the upper molars possess one palatal and two buccal or cheek fangs, the palatal being the largest, and next to that the anterior buccal fang. The lower molars possess two fangs, one placed behind the other, and of these the anterior is markedly the largest. The fangs of the lower are generally much broader and longer than those of the upper molar teeth.

A difference has been stated as existing between the form of the temporary contrasted with that of the permanent teeth. This is not confined merely to the size of the permanent teeth being so much greater than that of the deciduous set; but the temporary teeth are peculiar in two respects—first, they have the crown very much contracted at its junction with the fang or fangs, so as to cause a bulging or shoulder at that part where the tooth rests upon the gum; and second, in all the multiple-fanged teeth in the temporary set, the fangs are spread much more widely, and their separation increases much

more rapidly toward their extremities than is the case with similar teeth in the permanent series. Both these peculiarities will be found of some service to be kept in mind in grasping a temporary tooth, and in proceeding to its extraction.

Mucous Membrane of the Mouth, etc.—The entire cavity of the mouth is, in common with other portions of the alimentary canal, lined by a structure analogous to the skin covering the external surface of the body, and termed mucous membrane. Several bodies, termed salivary glands, are associated with the mucous membrane of the mouth, and aid in supplying moisture, in the form of saliva, to that cavity. The principal glands are three in number on each side, namely, the parotid gland, the largest of the three, situated in the neighborhood of the ascending ramus of the jaw, and opening by a duct, called the duct of Stenon, on the internal surface of the cheek, opposite the second upper molar tooth; the submaxillary gland, situated under the horizontal ramus at its back part, and opening into the mouth by a duct, termed Wharton's duct, terminating under and near the front part of the tongue; and the sublingual gland, situated under the tongue on each side, and opening by several small outlets near the orifice of Wharton's duct. The whole mucous membrane of the mouth, together with the salivary glands, sympathizes largely with the teeth in their diseased conditions, and becomes the seat of many painful affections in irritation of the parts arising from this cause.

In many cases a large deposit of calcareous matter takes place from the saliva and attaches itself in thick masses to the crowns or any exposed portions of the teeth. This deposit is termed tartar or salivary calculus. The operation termed scaling consists in the removal of this substance from that surface—generally the buccal or lingual surface—of the teeth. Instruments for this purpose, termed scalers, are to be had in a variety of forms. They are used by inserting the point into or under the masses of tartar and scraping, or if in large quantity lifting, it away, taking care not to loosen the teeth in so doing. The roughness left after scaling may be removed by rubbing the exposed enamel with powdered chalk on a piece of cane or pointed wood, but the feeling soon passes off without any particular measures being employed.

CHAPTER III.

DENTITION: ITS DISORDERS AND THEIR TREATMENT.

DENTITION, in the common acceptation of the word, appears to be too frequently confined to that period at which the temporary teeth make their appearance above the gum; and in this restricted sense constant reference is made to a number of affections occurring during infancy, and attributed to the morbid influence of, exclusively, the eruptive stage of this process, under the various names of teething, cutting the teeth, etc., all having regard to the penetration of the tissue inclosing the tooth, as if this were effected, not according to a vital process, but by mechanical force, while the other stages are never taken into account at all. It is of importance, however, in the consideration of this subject, to bear in mind that the process of dentition is in all its stages a natural one, regulated by the same physiological laws as other healthy actions, and ought to proceed without constitutional disturbance. It usually does so in all animals, so far as we know, with the exception of man; and, in his case, when disturbance happens to take place, it is to be regarded as arising from some peculiar abnormal condition of the parts concerned in, and not at all as an inherent effect of the process itself.

Whatever complications may arise as secondary consequences of dentition, pain seems to be its most frequent as well as its most simple accompaniment, and it is to the immediate causes of this condition, as mainly productive in its results of those maladies observed to be more common about this age, that attention has been so often directed. In children at this age, the manifestations of pain are unmistakable, although it becomes a very difficult matter in many cases to assign to such pain an exact locality. Pain, when associated with the tooth germs, may be either of a neuralgic or inflammatory nature. Where it seems transitory or intermittent, it is probably neuralgic; where it is persistent, and especially

if accompanied by swelling, heat, or redness of any part of the gums, inflammatory action is, of course, evident. It is in either case, however, comparatively unimportant, so long as the evil is confined to the mouth. When it reacts upon the general system, and leads to functional derangement, interference of some kind becomes necessary.

If no indications of inflammation exist in the mouth, and no tooth may, according to the natural course of events, be expected to appear for a considerable time, some substance should be given the child to rub against its gums, care being taken that such substance should not be liable to breaking or passing into the mouth—such as crusts of bread, small keys, coins, and the like. In this way an increased flow of saliva is produced, and a derivative action, as well as a kind of fomentation, to the parts is obtained; and the alveoli and gums seem to be acted on, probably by the friction and pressure accelerating their absorption.

Where, on the other hand, the gum is red or hot, or appears tense and stretched by the pressure of the crown of the tooth beneath, more active measures may be employed. The chief of these is what is termed scarification. This consists in making an incision down upon the tooth, the object being to relieve congestion and to facilitate the egress of the tooth, by dividing any bands or bridles of tough mucous membrane opposing its escape. The method of performing this little operation in the easiest manner will be found to be either by the ordinary gum lancet or by means of a sharp-pointed, curved, and somewhat short bistoury—that known as Syme's abscess knife being the most suitable,—and making a crucial incision completely through the tissues covering the tooth. This should be adopted only as a last resource, and after mature consideration. Where apparently causeless convulsions, for example, occur during the active stage of dentition, or where the eruption of previous teeth has been uniformly attended with much suffering, less hesitation may be necessary; but in other cases some local evidence of irritation should always be present before having recourse to such practice. And some attention must be paid to those periods in the process of dentition when the various teeth may be naturally expected to make their appearance, because it is at such periods that this operation is most likely to be attended with benefit.

The temporary teeth are not subject to irregularity in their arrangement. This, on the other hand, is a very common occurrence among the members of the permanent set. The most marked forms of irregularity seem to occur in the front part of the dental series, generally among the teeth anterior to the bicuspids. Sometimes the irregularity is confined to mere crowding and displacement of the teeth in one or other jaw; sometimes it leads to more perceptible deformity, such as projection of the under teeth beyond the upper, leading in this way to the patient being what is termed under-hung.

The treatment of dental irregularity consists of two kinds, —first, that of providing sufficient space to accommodate the teeth in their regular order; and, second, that of forcing them into their natural situations when such space has been provided. The first step, then, being to obtain space for the displaced teeth, it generally becomes necessary for this purpose to extract one or more at some part of the mouth. The question is, which teeth to select for removal.

A difficulty exists in most of these instances, arising from the fact that not only the present condition but the prospective circumstances of the case require to be taken into account. In many cases, for instance, in irregularity of the incisor teeth, the extraction of two temporary incisors might be required to make room for one permanent one, which may be making its appearance out of line owing to their presence. But in extracting such two temporary for one permanent tooth, we may be sacrificing the space which one of the two temporary teeth removed was, as it were, keeping for its own proper successor. In other words we should be regulating one permanent tooth at the expense of entailing irregularity on another. The extraction of the temporary canines would frequently appear to present the simplest and most obvious method of affording extra space for the incisors situated between. But as these canine teeth are not shed, nor their successors erupted, till long after the incisors on the one side of them and the bicuspids on the other have appeared in the mouth, the chances are, that by the early and premature removal of the temporary canine the permanent tooth would, at its proper period of eruption, find no space left for its occupation. Such considerations as these ought always to be kept in mind before precipitately extracting what may appear to be the tooth or teeth at fault.

The canine teeth are subject to great irregularity in position; but of all other teeth they resume their place with the least amount of interference. If, however, the anterior bicuspid threatens to leave too little space for the canine, the second temporary molar of that side should be extracted, rather than the temporary canine, as this tooth serves to keep a space vacant for its expected permanent successor.

Where all the temporary teeth are already removed, the first or anterior permanent molar is the next to be sacrificed, as this, of all the permanent set, is the one most subject to be lost.

Lastly, in such cases as those where it seems hopeless to expect that sufficient space will be gained by the removal of teeth at a distance from those to be regulated, such of these irregular teeth themselves as seem least serviceable, and most likely to facilitate the rearrangement of the others, may require removal; always bearing in mind that the canines are perhaps the most durable, and in that respect consequently the most valuable, teeth in the whole series, and the first molars the least so.

When sufficient space has been gained, the displaced teeth may be forced into position in a variety of ways. The principle upon which all of these, however, are founded, consists in a plate of metal, or other material, being accurately fitted to the palate or jaw, and so securely fastened in its place as to afford a fixed point from which the displaced teeth may be acted upon, either by being pressed into their place by little wedges, and such like means, or being dragged into it by the use of ligatures; considerable time—some months generally—being required for the accomplishment of such an object, in whatever mode it may be attempted.

As the making of such plates requires all the experience of a regular mechanical dentist, it seems unnecessary here to dilate upon their construction. What chiefly devolves upon the surgical practitioner is, to see that such plates, when supplied, are continuously worn, and to impress upon the mind of the patient and attendants the length of time required for effecting those ends for which their use is intended.

CHAPTER IV.

DENTAL CARIES, NECROSIS, AND EXOSTOSIS; ALVEOLAR ABSCESS AND FUNGUS OF THE PULP.

THE pathological conditions under which the dental tissues are met with naturally seem to arrange themselves under two separate heads. First, those where a morbid development of new tissue occurs; and second, those where the normal tissues of a tooth become deteriorated or destroyed. Exostosis of the fang may serve to exemplify the first, and, dental caries may be taken as illustrative of the second of these divisions.

The ordinary characters of caries are in general familiarly understood. It consists in a diseased condition of the dental tissues, especially of the dentine, whereby it becomes disintegrated and its lime salts disappear, leaving a large, softened, and discolored cavity in the tooth, which, when left to itself, ends in the crumbling down and total loss of the whole crown, and frequently of the greater portion of the fangs. At its earliest stages this affection usually attracts little or no attention. This arises from the small amount of sensibility existing in the dentine of a previously healthy tooth. Considerable morbid change may here, however, as in other tissues, take place without pain, and its occurrence thus be overlooked. Generally a slight discoloration exists at the site of the disease from a very early period. A dark spot or streak appears on some part of the enamel, very often at some part where it is thinnest, such as in the hollows of the crown of a molar tooth, or where the enamel becomes attenuated as it approaches the fang. At such points the flaw becomes more and more apparent; the enamel assumes a friable and undermined appearance; and at some unexpected moment, this structure gives way more or less and reveals the altered dentine below, a state of matters probably up to this time unsuspected. From this period the distinguishing characteristic of dental caries, in

contrast with that of other osseous tissues, is manifest, namely, the essential part played by chemical action from without, in addition to those changes going on from within—vital becoming combined with mere chemical action, and the tissues of the tooth being literally decomposed. Pathological changes render the substances of the tooth open to the attacks of chemical agencies existing in the secretions of the mouth, and by these last the calcareous matters of the diseased structures are dissolved and washed away. The microbe theories and the action of bacteria and bacilli may yet be found to explain what is still obscure in this process. The structure primarily affected is generally the enamel. Very soon, however, the dentine suffers, and frequently the cement also becomes involved in the disease. Sometimes these two latter structures appear to be first affected. The nearly inorganic nature of the enamel would almost preclude the idea of any lesions primarily occurring there being of a vital nature. More probably, where this substance is affected in the first instance, it does no more than favor or excite the commencement of true caries in the dentine beneath.

Besides these somewhat anomalous characters presented by dental caries during its progress in individual teeth, there are certain peculiarities manifested by it in the manner in which it spreads among the various members of the dental series. Certain teeth, such as the first lower molars, are much more liable to its attacks than others, and it generally attacks in a uniform manner corresponding teeth on both sides of the mouth. Frequently the disease suddenly commences and goes on in a series of successive attacks for some months, or even a few years, until a number of teeth have been destroyed, when it suddenly and inexplicably disappears, and perhaps recurs no more during a lifetime. At other times, in cases where one or two obviously defective or perhaps injured teeth exist in a mouth, caries will appear in some altogether unlooked for quarter, leaving the suspected teeth unmolested. Most commonly it prevails to the greatest extent in young persons, but its ravages sometimes commence almost as soon as the temporary teeth appear, and sometimes its first attack occurs only in advanced life.

Different theories have been advanced regarding this peculiar disease; but unless it be considered as partaking of the

character both of a constitutional affection and of a lesion produced by local causes, it seems difficult to account for its somewhat exceptional if not unique phenomena. According to one theory, dental caries is set down as an exclusively chemical process, a mere decomposition of the dental tissues. According to another, it is a purely vital action, consisting in gangrene or mortification of these tissues—neither view, however, seeming to be correct.

From what has been ascertained regarding the development of the teeth, they are originally formed from mucous membrane. We must therefore consider them as dermal organs; organs analogous to such appendages as nails or hairs, and consequently we may naturally expect them to be subject to attacks of disease such as are associated with other dermal tissues. In this manner there is no reason for considering that dental decay is an exclusively chemical action or a mere decomposition of the substance of the tooth by the action of the oral fluids. Were this the case, all teeth would be equally affected, which we know does not occur. And even if, as has been advanced, such chemical action only occurred in exposed or defective dentine, we should find broken, or cracked, or worn down, or obviously defective teeth suffering more than others; which again is far from being invariably the case. But if we admit the accession of disease as possible in any tooth, however healthy or well developed, we get rid of the difficulty, and obtain a sufficient explanation of many otherwise unaccountable facts connected with this subject. Indeed, if it be held that defective development is a necessary condition for the inroad of decay, we admit that at an earlier period of the tooth's existence the vital functions of its tissues have undergone a lesion apart from the direct action of any external causes. And if development may thus be interfered with, that is, if the nutrition of a part can be arrested or altered during its growth, there appears little difficulty in extending the proposition to its nutrition at a later period being liable to somewhat similar disturbance, leading to its vitality being diminished, and disease thus established without the intervention of any extraneous cause. The vitality of a fully developed tooth is now an undisputed fact; and being vital organs, they will at any period be subject to disease originating from within, as well as injuries occurring from without.

Many phenomena, in the accession of dental caries, bear out such a statement. The direct sequence of such an affection on various temporary conditions of the body, and of organs in no way directly associated with the teeth, is more than sufficient proof of this. The effects on them of many constitutional disorders, of mercury, of pregnancy—even of disorders of the nervous system, such as during insanity, clearly demonstrate how very much these organs are influenced by causes which must act upon them, not physically, but physiologically, and consistently explain away many or all the difficulties attaching to the older theories of dental caries.

There seems little doubt, then, that this disease may be and is originally a vital action set up in the dental tissues, whether these tissues be congenitally defective or not. Where defect does exist, dental decay may certainly be favored and accelerated by such circumstances; but it does not follow that decay is impossible in a perfectly built and well-developed tooth. On the other hand, injurious results approximating true caries may arise from local causes; but where a mere local cause is at work, as in disordered secretions within the mouth, either its effects will not be confined to one or two teeth, but will extend equally to all without distinction, or it will confine itself to mere chemical decomposition of such individual teeth as come, in some obviously exceptional manner, under its influence. Such an effect, however, would fall more correctly under the head of chemical decomposition than of disease considered as a pathological lesion, and fails to account for the vital phenomena displayed in the selective progress, the various morbid changes, remarkable intermissions, etc., in decay, already alluded to. While the first molars seem to be the teeth most liable to caries, the lower incisors are those least so. No very satisfactory explanation of the prevalence of caries in certain teeth more than in others has ever been given; but there is one circumstance here deserving of some attention. Wherever the saliva lodges to the greatest extent, there we find the largest deposit of what is known as tartar or salivary calculus; and wherever such substance is found to be most abundant, there decay will be found to be most rare. This is well exemplified in the case of the lower incisors. Here the saliva lodges continuously, and in considerable quantity; and the result is that the greatest accumulations of tartar

are always to be met with in this locality. Now, of all other teeth the lower incisors are least affected with caries, those of the upper jaw being, on the other hand, very liable to this disease. The explanation here, then, may be that the peculiar alkaline character of the saliva neutralizes any acid which might be otherwise conducive to the loss of these teeth, and in this way serves as a defence in some measure against local agencies of a destructive character to these organs.

Such, in general terms, appears to be the nature of dental caries, by far the most common disease to which the human teeth are liable, and the loss occasioned by which is so great. The question may be asked, If dental caries be a true pathological lesion, why is it that no healing process is set up by nature, so that the ravages of such disease should be at least in some cases spontaneously checked, if not repaired? That such an attempt is made by nature has been shown to be the case. The microscope has revealed certain conditions around a carious cavity, manifesting an effort on the part of nature to limit the extension of the disease. But in the majority of cases among other organs than the teeth, it must be recollected that whatever healing effort may be made by nature, it would have little chance of being successful were the diseased part subjected to the same exposure as is the surface of a carious cavity in a tooth. Here the diseased action is kept up, as would be that of an ulcer in the skin, unless properly protected; and it is so far with such a view, and on such a principle, that in cases of dental decay the operation of stopping or filling the tooth is adopted.

Besides caries, one or two other affections of the teeth render their removal in many cases necessary. From various causes, such as blows, inflammation of the alveoli, etc., a tooth may be deprived of the little vitality it naturally possesses, and in this way it may, without much alteration, become necrosed, or, what is the same thing, it dies and becomes loose. Such necrosed teeth lodging in the socket act as foreign bodies, and often give rise to much irritation; in such cases they are always better removed at once. Sometimes a tooth is only partially affected with necrosis: a part of it is deprived of its vital supply and dies. Here the irritation set up by the presence of a partially dead tooth may not be so great; but the gum is very apt to be absorbed, the alveolus to become filled

up, and the tooth to be extruded from its socket. Necrosis in many, although not in all, cases may be detected by the uniform, dark, somewhat horny appearance, generally assumed by teeth so affected. If such teeth excite no irritation, and are in any way useful, they need not be extracted; but if any irritation is set up by them, the only remedy is their removal.

Exostosis is a diseased condition very common among teeth, and the results of which occasion much annoyance of various kinds. The disease most usually consists in a thickening of the substance coating the fangs, and already described as the "cement." This thickening may be general, when it assumes the appearance of uniform enlargement of the root of a tooth, or it may be partial, and manifest itself in the form of nodules or projections of various kinds upon the surface of the fang. Sometimes exostoses, or nodules, or patches of a hyperostotic nature occur in the pulp cavity, and occasionally even on the crown of a tooth. The principal evil effect produced is pain, and this is by no means confined to the seat of the disease, but may occur in the neighborhood of other teeth, or in the chin, or cheeks, or even in localities still more distant from the exciting cause. Its detection is difficult, as no reliable indications of its presence are known. As it is generally, however, in diseased teeth that exostosis commences, some suspicion ought always to attach to such teeth where unaccountable pain occurs in their vicinity, whether they themselves may suffer from tenderness or not. Here, again, extraction is the only remedy, and will be in all probability easier to perform early in the disease, because the deposit of new cement, being originated by some irritation in the tooth, continues to increase so long as any irritation lasts; and if occurring upon the fang, such deposit may mechanically fix the tooth more immovably in its socket, by each nodule making for itself a depression in the interior of the alveolar walls.

Such are the diseases by which the greatest loss of teeth is occasioned. In necrosis and exostosis, extraction may be said to be the only certain remedy. In caries, the tooth may frequently be saved, provided the disease be treated early, by the cavity being filled up and protected in the manner afterward to be described under the head of Stopping.

The sharp and spicular edges of the remains of carious stumps frequently cause annoyance by scratching the tongue

or cheeks. A file may be used to rectify such a state of matters, but it is much simpler and less disagreeable to the patient to cut down such points with a pair of dental excising forceps —a straight and a bent pair of which should always be possessed.

In certain cases, where the temporary set is long of being shed, the points of some of their fangs often protrude through the gum, and cause considerable uneasiness. An elevator ought to be inserted under such points, and the root prised out in this manner.

Teeth in which caries has advanced to some extent, or which have become necrosed, frequently constitute a source of much suffering and annoyance, owing to the irritation caused by their presence. The organic structures within and immediately surrounding such teeth are prone to take an inflammatory and septic action. Periodontitis is set up, followed by suppuration — the pus evacuating itself sometimes through the mucous membrane covering the alveolar walls or palate, and constituting what is called "gum boil"; or burrowing till it makes its exit at some distant point, such as through an opening in the cheek, or even as low down as the neck. Warm fomentations and the usual remedial measures employed in other forms of inflammation, or opening the abscess, may here act as a palliative mode of treatment; but removal of the cause by extracting the tooth at fault is the most certain cure in all such cases.

Another affection, also in most cases demanding extraction, is where the pulp appears as a red pouting mass protruding from the orifice, or projecting into the bottom of deep and large cavities in teeth where caries has been of rapid progress. Touching the mass with nitrate of silver may occasionally lead to its disappearance, but removal of the tooth is here also the more effectual cure.

CHAPTER V.

EXTRACTION, AND THE INSTRUMENTS EMPLOYED.

The principal points to be attended to in the extraction are the proper seizure of the tooth, and its detachment from the walls of its socket in that direction where least resistance is likely to be met.

In seizing a tooth, whatever instrument be employed, the part upon which a hold is taken must be of sufficient strength to withstand the force necessary for dislodging the fangs. In order to obtain such a sufficiently strong portion of a decayed tooth, a part beyond the decay must be sought for. As the decay, however, frequently extends so deeply that it encroaches on those parts lying deeper than the neck of the tooth—as where the whole crown is entirely gone and a deep cavity still exists in the remains of the tooth left in the gum—the part to be grasped by an instrument will lie beneath the margin of the gum, or even that of the alveolus. The instrument must consequently be thrust with considerable force within these structures, until it reaches a firm and sound part of the tooth, and there be made to grasp it securely, but cautiously. In reaching this part some difficulty will occasionally be met with. Where the decay has advanced on one side—or it may be on more than one side—below the level of the alveolus, the instrument, instead of fixing itself beyond the decayed cavity, will be very apt to slip into it, and thereby break down the remains of the tooth. And again, when the alveolus is of dense and hard consistence, or where its walls are very thick, as is often the case in the neighborhood of the lower wisdom-teeth, it often becomes a matter of great difficulty to insert an instrument between the surface of the fangs and the socket inclosing them. Where the walls, again, are thin but dense, and firmly attached to the fangs, they are, on the other hand, apt to be seized along with the tooth, and to increase the difficulty of its removal.

The detachment of a tooth from the alveolar walls surrounding it should, as has been already said, be made in that direction where least resistance may be expected. A tooth cannot always be drawn perpendicularly from its socket. Except in occasional instances of single-fanged teeth, the roots converge or diverge, or are bent in such a manner that they would be broken across before they could be removed by a straight pull. Moreover, even when the fangs are single, and not at all bent or distorted in any way, the firmness of their attachment is so great that the amount of force which would be required to dislodge them by a straight pull would be more than could generally be applied by the hand, and would be unnecessarily severe for the patient, as it would be injuriously diffused over parts at a distance from the tooth to be removed. It is of course impossible to tell beforehand what direction or what irregularity the fangs of a tooth may possibly assume, so that, instead of attempting to take such minor details into consideration, it will be found more expedient to take advantage of some general characters which may be said to be universally present in the conformation of the teeth and their containing alveoli, and to conduct their extraction accordingly.

The fangs of all the teeth are, as has been previously described, a little broader at their external than at their internal side or border, consequently they may be moved outward much easier than inward. Again, the external wall of the alveoli is much thinner and weaker than it is internally, consequently the external wall yields much more readily than the internal one. And, coupling these two facts, it will be seen that a tooth would be much more easily dislodged by a force applied in an outward and downward, or in an outward and upward, direction in the upper or lower jaw respectively, than by any other mode. There is, however, an exception to this rule, and that is in the case of the lower wisdom-teeth, the external plate of the alveolus being in their case very much increased in thickness by the strong ridge passing down from the coronoid process of the lower jaw. As these teeth, however, are comparatively small and not generally very firm, this disadvantage is so far counterbalanced. Before dislodging any tooth in this way, however, it is in many cases well to detach it from the thin external alveolar wall by a motion inward in the first place.

Keeping these facts in remembrance, the extraction of any tooth becomes much simplified, and the form of instrument most suitable for the particular case can easily be selected. Where all or most of the crown of a tooth remains intact, extraction ought to be performed with forceps. These are instruments which, speaking in a general way, act upon the same principle as pincers or pliers would do in the withdrawal of a nail. The blades of such forceps must be adapted to the particular tooth in two ways—first, they must be so bent as to reach it easily; second, their edges must be so shaped as to be easily inserted within the alveolus. No one pair of forceps can possibly be thus adapted for all teeth, the great variety in size, form, and situation of the different teeth rendering this impossible; and although all teeth can perhaps be got out with bone-pliers, or even with a common brad-awl, yet such methods of extraction are necessarily severe and imperfect. Five pairs of forceps will be found serviceable for most purposes, and fewer will not. These are a straight pair, and a pair with the blades nearly at right angles with the handles, both of which will be required for upper and lower roots and single-fanged teeth; a pair adapted for the lower molars, and two pairs for the upper molars—one for the right and one for the left sides. Many other forms would be desirable, and may be collected, but these five pairs will be found absolutely necessary. It has been stated that the blades at their extremities should fit that part of the tooth they are intended to grasp. In this way it will be seen that for single-fanged teeth these blades will merely require to be adapted for the oval form presented by a transverse section of such fangs—hollowed out, in fact, so as to apply themselves more closely to their surface. For multiple-fanged teeth, the forceps must also be, on the same principle, adapted to the form of the surface to which they are to be applied. One pair will be found to answer for the double-fanged molars of the lower jaw, but for the three-fanged molars of the upper jaw two pairs will be necessary, as these three fangs are always so placed that two of them are next the cheek and one toward the palate; consequently the forceps which would fit one side will not at all fit the other. With this number of forceps, properly constructed, almost any case of extraction may be undertaken where forceps can be used at all.

But there are cases where forceps are unserviceable. In many instances where stumps are causing irritation, or require removal, they are so far decayed as to be altogether beyond the reach, or too friable to admit of the use, of any grasping instrument. In such cases recourse must be had to what is termed the lever, elevator, or tooth-punch. This most useful instrument exists under a variety of modifications, but in all its principle consists in an instrument terminating in a strong spoon-shaped or sometimes spear-shaped blade, from a quarter to fully half in inch long, intended to be thrust down between the stump and its containing socket, wherever a proper purchase or fulcrum can be obtained, and by which, in the manner of a lever, the remains of the tooth can be extruded from the alveolus. One or more of these instruments ought always to be at hand in every case of tooth extraction; and their mode of use is so simple, that to attempt describing the infinite variety of modifications which may be followed in their application is unnecessary. The chief point to be attended to is, that such instruments be not allowed to slip, as considerable injury might thus be done to the cheeks, tongue, or other structures within the mouth.

Another instrument, formerly much more employed in tooth extraction than it is now, is the key. This instrument, from the immense power possessed by it, is liable to abuse in its application. Its form is too well known by all who are likely to be interested in these remarks, for any description of it to be here required. Suffice it to say, that when judiciously handled, and restricted to such cases as really demanded its use, the key has been of very great service indeed, and to discard its mention altogether would be overlooking an instrument which, in certain cases, formerly acted with simplicity and effectiveness.

By attention to such matters—to the form of the tooth—to the part where it is seized—to the direction in which it is moved—and to the construction of the instrument employed—tooth extraction becomes very simple. Any hurry is inexpedient in the operation; the eye and the hand should have sufficient time to enable the operation to proceed according to what is observed or felt; and it may be laid down, that whenever the tooth is felt to be started from its attachments, be it ever so little, all the severity of the operation is over. Keeping in

view, then, these general principles, their application in the extraction of each individual tooth will vary to a certain extent, but will be easily understood if the anatomical peculiarities of the tooth to be operated on be borne in mind.

The incisors of the upper and lower jaws are seldom extracted before these teeth are either loose or reduced by caries to a condition little better than that of stumps. This latter condition is much more common in the upper than in the lower jaw; as the inferior incisors are in far the greater number of instances lost by becoming merely loosened and extruded from the socket. In extracting the upper incisors by means of forceps, the round and conical fang permits of their being rotated at the time of their being also pulled downward and slightly outward from the alveolar cavity; but in the lower incisors, the movement for their extraction must be confined to that of bending them steadily outward, or rather forward, at the same time that they are forcibly raised from their socket, as, from the laterally flattened form of the fang, any attempt at rotation here would lead to the tooth being broken. Sometimes, however, as from advanced caries in the upper, or from great crowding among the lower incisors, the forceps cannot be employed. In these circumstances, recourse must be had to the elevator. The mode of using this instrument for the removal of single fangs of any description is much the same, the principal variations in its application arising from the difficulty of access to some situations in the mouth. For removing the fangs of the upper incisors a straight-pointed elevator should be employed. It should be inserted nearly parallel with the long axis of the tooth, with its flat or hollow side next the stump to be removed, and with considerable force, and by a semi-rotatory boring motion, be made to insinuate itself deeply alongside it, between it and the adjoining root or tooth or surrounding alveolus. The instrument will then probably have obtained a hold or bite upon the stump, which should now, by making the handle of the elevator describe part of a circle, be prised outward and downward from its socket. If, after it has been started by the elevator, the fang still adhere to the adjoining tissues, it can be easily lifted away by a pair of straight and slender-pointed forceps. The lower incisors have been mentioned as sometimes requiring the elevator to be employed, on account of crowding rendering

the application of forceps impracticable. Here the same form of elevator may be used in another method. Instead of inserting it down the alveolus, so as to make it lie parallel with and alongside the fang, it may be inserted diagonally across between the tooth to be removed and the adjoining one. The hollow or flat side of the instrument must be kept next the offending stump or tooth, and, in this position, driven somewhat downward between it and the adjoining, until a hold can be obtained on the side of the fang to be extracted, when, by now rotating the handle of the instrument on its long axis, the tooth will oe forced upward and outward from its socket. In other cases the same steps may be followed as in removing upper stumps.

The canine teeth of both the upper and lower jaw offer great resistance in their extraction. This is best overcome by using a strong but narrow-bladed straight forceps, inserting their points forcibly and deeply within the margin of the alveolus until a firm and somewhat extensive grasp of the fang has been obtained; and then, with a steady and powerful movement, first slightly inward, and then outward and downward in the upper, and outward and upward in the lower, the attachments of the fang will be found to yield, when it can with but little force be lifted from the socket. The employment of the elevator is sometimes required for the removal of these teeth. But except the greater amount of force here necessary, the instrument and its mode of use is the same as has been described in reference to the removal of the incisors.

The upper bicuspids, from their fang being commonly much compressed from side to side, and occasionally divided into two slender rootlets, are more liable to fracture than the lower bicuspids. The laterally compressed fang of the upper bicuspids renders it injudicious to attempt anything like rotation in their removal; they should be grasped deeply in the socket with a slightly bent forceps, and steadily moved inward and outward until they are found to yield, and then, with a straight pull downward, not with any sudden jerk, however, their extraction may be completed. The fang of the lower bicuspids, again, is long, round, and tapering. They would, therefore, admit of rotation in their removal, but this would be prevented by the upper teeth interfering with the necessary position in which an instrument would require to be applied for this pur-

pose, except by using a forceps with long and slender beaks, bent at right angles, or nearly so, to the handles. The beaks should be deeply sunk on the labial and lingual sides of the fang, when, by rotating the tooth slightly, it will generally start upward between the blades of the forceps without further trouble. Sometimes the stumps of bicuspids, both upper and lower, require the elevator to be used for their removal; but the principles upon which this is to be done are the same as those for such single-fanged teeth as the incisors and canines, already alluded to.

The molars of the upper and lower jaws differ from each other, as has been already described, in one important point, so far as their extraction is concerned, and that this is in the upper molars possessing, besides an anterior and posterior fang, another single fang directed toward the palate. In this way the upper molars require a separate forceps for the teeth of either side, whereas one forceps answers for extracting the lower molars of both sides. The molar teeth, both above and below, especially the anterior molars, require great force for their dislodgment. In this manner a very firm grasp has to be made upon them, and should caries be advanced to any extent, fracture is thus extremely liable to occur in their extraction. This accident is to be obviated by obtaining a hold upon the tooth at as sound a part of it as can be reached. The points of the forceps blades should be thrust deeply toward the alveolus, so as to lay hold on the fangs—not the neck or crown of the tooth—and then, with a force chiefly directed outward, the tooth, whether above or below, is to be detached from its connections with the socket. The third molars or wisdom-teeth frequently present characters so exceptional, however, as to render some modification of this rule necessary. These teeth are often found directed outward or inward, or forward or backward, and in such circumstances their extraction demands a corresponding adaptation on the part of the operator. This, however, can only be, in each individual case, decided on by his own judgment and skill, the general principles of procedure remaining the same. After a molar tooth has been loosened in its socket, there is occasionally some difficulty still existing in completing its removal; and this frequently arises from one of two causes. First, in the anterior molars the fangs are often so divergent as to prevent their

passing through that part of the socket originally embracing the neck of the tooth, or even to clear the space left between those teeth immediately adjoining the one attempted to be removed. And second, in those cases where the crown of a molar tooth has been long decayed to a level with the gum, the adjoining teeth tend to bend and close over the remains of the diseased molar, and to render its extraction liable to be accompanied by loosening or even complete dislodgment of one of its neighbors, especially of the second bicuspid, where this tooth is involved in such circumstances. Where such merely physical difficulties, however, present themselves in the extraction of these teeth, there is obviously nothing except a watchful eye and a ready hand, on the part of the operator, accompanied with a familiar knowledge of the anatomical form and relations of the teeth themselves, that can be laid down as of universal application for overcoming these obstacles.

Patients frequently mistake the tooth which causes them pain. Thus where a mere stump adjoins a tooth which may have a decayed cavity in its crown, it is much more likely that the tooth is the seat of uneasiness, although the patient may think otherwise. This ought always to be kept in mind, and explained at the time, as it may save the operator from any reflection being cast upon him afterward as having taken out the wrong tooth.

Where two or more teeth are to be extracted, always commence with the one giving most pain; and, next to that, with the one most difficult to extract, and which would be most interfered with by the bleeding of any one extracted previously.

Sometimes, after the removal of a tooth, unusually protracted or excessive bleeding may occur from the alveolar vessels. In certain cases—and these are the most to be dreaded —this arises from deficient quantity or defective quality of those constituents of the blood which lead to what is termed its coagulation. Cases of this kind require medical treatment of a constitutional nature, in addition to local measures for arresting the flow of blood; but the directions for such treatment scarcely fall within the province of such a work on dental surgery as this. Where the cause is purely local, however, the treatment will be local also, and may be briefly summed up as consisting of pressure accurately applied and retained

for twelve or twenty-four hours in contact with the bleeding surface. The best mode of applying such pressure is by means of a very narrow strip of lint firmly packed into the socket of the tooth until it is completely filled—care being taken that all clots, loose stumps, etc., have been previously cleared away. Should it be desired, any of the usual styptic or astringent applications may be employed along with such pressure. The lint may be soaked in this solution previously to its being employed as a plug; but there is little doubt that whatever accessories may be had recourse to, pressure, accurately and continuously applied, is here the most reliable measure for the suppression of hemorrhage; and the absolute avoidance on the part of the patient of the common practice of sucking the wound to see whether the bleeding has stopped.

CHAPTER VI.

FILLING OR STOPPING TEETH—THE MATERIALS EMPLOYED, AND THEIR MODE OF USE.

FILLING or stopping a tooth affected by caries is an operation requiring care in many ways, and attended with considerable difficulty in its performance. Indeed, it may be stated that without some practical experience no amount of description or directions will ever enable any one to make what a dentist would call a thoroughly good stopping; nevertheless, by following out a few printed instructions, the ordinary medical practitioner might in many cases, in an emergency, or where the services of a trained specialist could not be obtained, fill or stop a tooth with such a degree of perfection as would relieve much suffering and save a tooth from destruction. The numbers of instruments and appliances constituting a full equipment for this operation, as performed by the dental practitioner, is very great, but for the ordinary medical man a very few might suffice on those occasions in which his services are likely to be called into requisition. These instruments are not always to be found in stock at the ordinary cutlers; but where this is not the case, they can always be procured by them at the various depots and manufactories of dentists' materials. Those absolutely required for the purposes under notice would as a minimum consist of a few "excavators," "bur-heads," "pluggers," and one or two small files.

The excavators are instruments for clearing out and shaping the carious cavity, and consist of slender steel rods, bent at various angles for about a quarter of an inch from the point, which is ground to a sharp chisel shape. From three to six of these might provide a sufficient number of forms to enable most cavities to be operated upon. The bur-heads, again, are similar instruments, but having a small knob or a cone-shaped enlargement at the point, which is cut like a file, and used

with a rotatory motion for opening up and dressing the cavity to be stopped. The same number of these, of different forms and sizes, might be sufficient. The pluggers are, as their name implies, used for inserting the stopping. One or two of these might be enough for the softer fillings, while those for gold or foil stoppings are sold in sets, to describe the members of which would here be of no advantage, as they require to be seen in order to being understood. The small files, in their various forms, are instruments too well known to require mention.

A tooth selected for filling should not be too far advanced in decay. The intention of the operation properly is to save what remains of a tooth. What is desirable is to fill up the cavity left by an attack of caries, and so to cover up and protect the exposed but otherwise sound dentine into which such cavity has opened. If this cavity should have extended completely through the dentine, so as to reach the sensitive pulp in the centre of the tooth, the operation becomes more complicated, and the chances of success greatly diminished. If the crown of the tooth be nearly all gone, and what remains be occasioning suffering, or where the tooth is loose, or where the root or socket is inflamed, or where gum-boil has existed in connection with the tooth, stopping, as a general rule, should not be attempted. Exceptional cases do now and then occur, but stopping, in such conditions as those described, may be undertaken by the specialist, but does not fall within the scope of the general practitioner. Here its legitimate object is that of merely plugging up a cavity penetrating the dentine, where the disease is limited to this lesion. And if patients allow the disease to proceed, or if it be overlooked in any way until total or almost total demolition of the crown of a tooth be accomplished, then extraction, and not stopping, is the proper remedy in his hands.

The first step in stopping or filling a tooth is to get ready access to the cavity, so as, if possible, to see into it. In order to do so, the patient must be placed in a position that will most accommodate the operator. Where the cavity exists between the adjoining sides of front teeth, they had better be separated by stretching a small, flat strip of india-rubber, and inserting it between them, so that, on contracting by its own elasticity, it will either at once, or in some hours afterward,

separate the teeth. If the cavity exist between the molar or bicuspid teeth, their adjacent sides should for a like purpose be cut away to a certain extent by a strong excavator or a file.

The second step is to clear out the cavity, and to shape it so that the stopping may be securely retained. A large amount of softened dentine will generally be found lining the cavity in a carious tooth; this must be cleared away by means of the small hoe-shaped instruments termed excavators, until the sound, firm, normal dentine is reached. The enamel edges forming the mouth of the cavity should be reduced to a regular form by a bur-head or excavator, so that no rough, overhanging, or projecting portions may be left. And if not perfectly cylindrical, the cavity itself, so cleared out and prepared ought to be as nearly so as possible, and, if anything, rather larger within than at the orifice.

In many cases, however, it would be disadvantageous, even if it were possible, to obtain a cavity of this kind. The decay is often shallow, although somewhat extensive superficially. In other cases, one part of it may be deep, while the rest diminishes in extent, and approaches the surface by a gradual incline—a form of cavity frequently found on the sides of the upper front teeth, where it exists as a deep excavation at the neck of the tooth, and gradually diminishes as it comes to the surface and approaches the cutting edge, until it forms a mere chink or fissure in the enamel. In these cases, the edges of the cavity should be well counter-sunk or under-cut, in order to fix the stopping in its place.

The third step is to fill the cavity. This must be done with some material which will withstand the effects of such decomposing influences as it may be subjected to in the mouth, and the usage to which it is liable in mastication. The most common substances employed are different preparations of gutta-percha, oxychlorides of zinc, etc., in various disguises and under different names, various amalgams, and gold or tin foil. Several materials are also employed as temporary stoppings, where a tooth is so tender as to render it advisable to delay filling it permanently. These are such substances as cotton-wool dipped in a solution of mastic, or of gutta-percha in chloroform, and which, by renewal from time to time, may serve to protect a carious cavity from the air until its sensitiveness becomes diminished.

Among permanent stoppings, the amalgams usually employed are those whose bases consist of various proportions of tin and silver, formed into a paste with mercury. The tin and silver, with any other metals, may be melted together and run into an ingot; this can then be reduced to filings of sufficient fineness to mix easily with the mercury when required.

Where gold foil is used as a stopping, it should be quite pure, and so thick that a leaf of it, about four inches square, should weigh from three to six or seven grains. Tin-foil may be used a little thicker.

When the cavity is prepared, as already described, it should be thoroughly dried, and kept as dry as possible during the filling process. If gutta-percha stopping is the material employed, a pellet of sufficient size is to be heated over a small flame—not in hot water—until it is as soft as it will become without burning; and if the tooth can bear it, the plug should be inserted in this state, and packed into every crevice, care being taken that especially the orifice of the cavity should be hermetically sealed up by it. The instruments necessary for this process are few and simple, and they answer equally well for amalgam fillings. They are what are termed pluggers, and consist of instruments about six inches long, having a steel shaft fixed in a handle of wood or ivory, and sometimes the shaft itself so formed as to dispense with this construction. The shaft terminates in a blunt, rounded point, bent about half an inch from the end of the instrument, so that the extremity may be easily inserted into the cavities in molar teeth, etc. Two or three sizes of these instruments will be sufficient, of the respective diameters at the point of one, two, and three-sixteenths of an inch.

Where amalgam is used, nearly the same proceedings are required as in the working of gutta-percha fillings, with the exception that the amalgam is plastic at ordinary temperatures. The metal filings and the mercury should be rubbed up together in a small mortar, and afterward kneaded in the palm of the hand by the finger and thumb, and the less mercury that can be used the better. The cavity should then be lined with the amalgam, more and more of which should be added until the stopping is complete. Neither in gutta-percha nor amalgam nor any other stoppings should any superfluous

quantity be left about the tooth, nor should any part of the stopping be allowed to press on the gum or adjoining parts.

The osteo-plastic, white enamel, rock cement, fossiline, or in other words the zinc oxychlorides and zinc pyro-phosphates, are white stoppings, which set after being introduced into the tooth, much in the same way that plaster of Paris sets in a mould. These preparations are sold in packages in the shape of a white powder in one bottle and a liquid in another; and when about to be used a little of the powder is to be mixed, on a glass or porcelain slab, with a little of the liquid, to the consistence of thin putty or dough, and inserted and pressed into the cavity to be filled, in the same way as an amalgam filling.

In these and in all other varieties of stopping it is essential that the cavity to be filled should be kept quite dry. This in such a locality as the mouth is not any easy matter, and in order to facilitate its accomplishment dentists are in the habit of using what is termed a rubber dam to protect the tooth from the saliva. This contrivance consists of a sheet of thin india-rubber or caoutchouc having small holes punched in it for the tooth or teeth to be filled being passed through. The elasticity of the rubber renders a very small hole sufficient for a tooth being passed through, and on this being done the rubber, when pressed down to the neck of the tooth, grasps it so closely as to exclude the entrance of the saliva. One or any number of adjoining teeth can be thus passed through the rubber, and the portions intervening between each hole being pressed down between the teeth and fixed there in a variety of ways, it acts as a very effectual barrier against the presence of moisture during the operation of filling. For a more detailed account, however, of this and other technical accessories in the performance of dental surgery, reference must be had to the special works published on that subject—the general principles of their employment being all that can be, or seems necessary to be, mentioned here.

Filling with gold or tin foil is a much more difficult process than either of those described. No mere description of the various modes of operating will ever enable any one to become expert at its performance without actual practice. The principles upon which this method of stopping is conducted are, that the first portions of foil introduced being actually fixed and adjusted by pressure to the floor and walls of the cavity,

and each successive portion, as it is added, being consolidated against the preceding ones, an all but solid mass of metal shall exist within the cavity on the operation being finished.

The instruments employed are in their general form adapted somewhat like those for amalgam stopping, but instead of rounded or blunt-pointed extremities, the pluggers used for foil-stopping are usually chisel or wedge shaped; and sometimes serrated at the edge. Various sizes and curves of such instruments are required to enable them most easily to enter any cavity according to its situation. The foil to be introduced may be had lighly rolled into little soft pellets, or into short cylinders, or a strip may be folded and twisted into the form of a loose rope, or, in short, fashioned in whatever form may be found to pack with most security and solidity, according to the nature of the cavity and circumstances of the case.

Whatever method be adopted, the cavity must in one way or other be packed quite full, the object in all cases of stopping being to produce a plug that shall completely fill the cavity, resist chemical action, withstand the tear and wear of mastication, and be impervious to fluids.

Where teeth are so sensitive that stopping cannot be performed, it sometimes becomes necessary to destroy the pulp entirely. In these cases some escharotic, such as chloride of zinc, or even common white arsenic is very minute quantity, may be introduced into the cavity, and retained there by a temporary filling of wax or gutta-percha for some hours, when it should be removed with the remains of any dead pulp, after which the stopping may be proceeded with.

Sometimes, after stopping with any metallic substance, heat or cold produces uneasiness, owing to the better conducting powers of such metal. Here some other stopping may be tried, as, for example, gutta-percha. But should such symptoms continue, extraction will most probably be required in the end. Occasionally, also, a stopped tooth may become the cause of insufferable pain, owing to some discharge of matter form its carious surface being pent up by the stopping. In such a case, the stopping may be removed or a hole drilled into the pulp beyond the cavity which has been stopped; but as this is almost reducing the tooth to its former condition, for which the stopping was performed, extraction is the more satisfactory treatment, where the special services of a dentist cannot be secured.

CHAPTER VII.

ON ANÆSTHETICS IN DENTAL SURGERY.

Considerable attention has been directed toward discovering or elucidating those methods by which pain during the performance of the little operations required in dental surgery might best be diminished or altogether avoided; many of the experiments, with such a view, have been conducted with much assiduity and not a little expense; and there is no doubt that some credit is due to those who have, even by the failure of their proposed methods, contributed to our knowledge on the matter. The means adopted have generally been of two kinds, namely, 1st, the induction of a state of general anæsthesia; and, 2d, the induction of insensibility at that part only where pain is to be inflicted.

Perhaps in no other operations have the circumstances of the case to be more taken into account in the induction of anæsthesia, whether local or general, than in those performed within the cavity of the mouth. The locality itself, the severity of the pain inflicted, and, at the same time, its short duration in dental operations and the complications attendant on the interference, here sometimes unavoidable, with the function of respiration or even deglutition are circumstances which present themselves for consideration, as specially attaching to this department of surgery, and sometimes entailing extra risks to those inherent to the employment of anæsthetic agents in other cases, where the operations are in a different and more accessible quarter; and it is mainly owing to these facts that so much difficulty, and so much variety of opinion exists with reference to the employment of such obtunding agents in the practice of dental surgery.

It has always been an object with dental practitioners to discover, if possible, some mode by which local insensibility to pain during tooth extraction might be obtained, but no gener-

ally applicable or effective means of this kind have as yet been realized.

Little need be said of the attempts to induce local insensibility by mere external application of anæsthetic agents, since, as yet, it has failed to produce reliable effects anything like sufficient to enable a tooth to be extracted without pain. The subcutaneous or here rather submucous injection of cocaine—1 gr. of the hydrochlorate in 10 minims of water—has been found effective as a local anæsthetic. Its success, however, has as yet not been invariable. When applied to an unbroken surface, such as the outer coats of the eyeball, insensibility to a greater or less depth from the surface is produced; and where such superficial coverings are of so sensitive a nature as to constitute the chief seat of pain during an operation, its anæsthetic effects are unmistakable. This occurs in such cases of tooth extraction as those where the gum is the principal source of pain, as in the extraction of loose stumps, where the gum has to be somewhat roughly pushed aside in order to obtain a sufficient hold upon the stump to be removed. In the extraction of firm and less diseased teeth, however, the cocaine requires to be injected into the tissues, as has been mentioned, when in many cases it acts in this way as a mode of producing all but complete local anæsthesia. In other cases, however, even this mode of procedure has not the desired effect. Certainly not more than 1 gr. should be injected, as unpleasant after-symptoms are sometimes produced by this agent.

Congelation of the parts by the application of freezing mixtures has been suggested for the induction of local insensibility during tooth-extraction and other operations in dental surgery. This, however, is by no means easily managed, nor at all certain in its effects, while the pain produced by the freezing process itself is in many cases worse than that of extraction. Electricity, which was also at one time held in considerable repute for this purpose, need now be no more than mentioned here.

There seems, however, to be no reason for altogether despairing of ever being able to discover some mode of producing insensibility over a limited region. We know that several anodyne remedies produce this effect to a certain extent, and from the relations of the teeth to the tissues covering them—

no part of them being in reality at any depth from the surface —we may, at least, hope with some confidence in their extraction being yet practicable with much amelioration, if not entire absence of pain. In the mean time, however, no method which has been tried can ever be compared, either for facility or effectiveness, with that of inducing a state of general anæsthesia; and to do this, chloroform, sulphuric ether, and nitrous oxide gas are, so far as our knowledge of such agents as yet extends, best known and decidedly the most desirable in every way.

According to some elaborate investigations long ago made on this subject, five different degrees of narcotism seem to be producible by chloroform. The first of these includes all the effects of that agent so long as perfect consciousness remains; the second is while the mental functions are impaired, but not necessarily suspended; the third is when voluntary motion ceases—this also being the stage in which rigidity of the muscles and inarticulate mutterings occur, and the perception or consciousness of pain is lost; the fourth degree is during the complete relaxation of the muscles, when the breathing is stertorous, and the patient perfectly insensible; the fifth degree is that where embarrassment or cessation of the breathing takes place; the ultimate and greatest effect chloroform can produce being described as that where the irritability of the muscles is destroyed. These, though somewhat old, seem certainly very clear and distinct divisions of the consecutive phenomena of anæsthesia produced by chloroform. So much, however, in actual practice does each blend with and lose itself in another, that it is very rarely such stages can be made out with so much precision that they should be of much use or serve as anything like beacons by which to steer clear of danger; and as for any certain indications of having attained the sole object we desire in administering anæsthetics at all—insensibility to pain—we can confidently depend on having done so only when patients exhibit, among other symptoms, those here constituting the fourth degree of narcotism.

It would be out of place here to enter upon the views entertained and promulgated regarding death from chloroform, or any other of these anæsthetics. It is a great deal to know that death can be produced by them, and that there is no doubt of death having been so in a number of instances. It

cannot be said that in every case the system has been poisoned by them, but the patients have died; and whether their death was directly or indirectly due to them matters little, if it was due at all. The practical lesson taught is to keep a sharp look-out in every direction, to be alive to every kind of danger, and to be prepared to act at once in every emergency, as here, above all other occasions, delay or indecision is fatal.

The first and the principal object in exhibiting anæsthetics, then, is the avoidance of pain; but there are two subordinate objects which are nevertheless of much importance, and most desirable; these are the avoidance of shock to the system, and the means of rendering the patient completely passive in the hands of the surgeon. None of these ends, however, will be accomplished if the state of anæsthesia be not complete; and to produce this complete anæsthesia, and to know when it is produced, requires not only an intimate knowledge of the properties of the anæsthetic agent itself, but a certain amount of tact in its exhibition, to be acquired in no other way than by practical experience in its use.

Always bearing in mind that the part to be operated on should be placed so that the surgeon shall have the greatest possible facility for examination and manipulation, the most convenient and safest attitude for the patient during the administration of ether or chloroform is the recumbent or horizontal position. The dress about the throat and chest should be loose; the neck should in all cases be without any covering whatever; and the clothes upon the chest should be so arranged that all the movements of respiration may be at once and easily observed. In operations within the mouth it was, and to a less extent it still continues, customary to introduce a cork or some such substance between the teeth previous to or during the exhibition of the anæsthetic. In the case of ether or chloroform, although necessary in the case of nitrous oxide, such a practice is far worse than useless. The very first inhalations of chloroform in many patients create a slight degree of irritation in the fauces, often increase the flow of saliva, and generally excite a desire to swallow. This cannot be accomplished so long as anything keeps the jaws apart; the patient consequently struggles to rid himself of the difficulty; his struggles are mistaken for mere cerebral excitement; a contest takes place between the half-insensible patient and his

attendants: and probably the attempt to produce a state of anæsthesia is in the end abandoned. All such proceedings occasion delay. In exhibiting anæsthetics for such operations as those of dental surgery, it will be well to have everything so arranged that the patient may be kept under their influence for as short a time as may be compatible with the requirements of the case. The sooner the anæsthesia is here produced compatible with safety, and the sooner the patient can be relieved from its effects, when they are no longer desirable, so much the better. The operation itself ought to be completed with all possible celerity, and nothing like hesitation as to the particular instruments to employ, or loss of time selecting those required, or in any mere examination of the parts, should at this stage interfere with the proceedings. All these matters should be anticipated. The instruments likely to be used should be laid out in order before commencing to exhibit the anæsthetic; and, if possible, kept out of the patient's sight. The tooth or teeth to be extracted should at the same time be thoroughly examined, and the expedience of adopting one or other mode of extraction be then decided on. In order that speedy insensibility may ensue, perfect silence should be observed. The patient ought, if possible, to be without any apprehension that the anæsthetic is hazardous, or that no effect can be produced by it, or that the operation will be commenced before a sufficient quantity has been inhaled. Wherever a patient is nervous or anxious about these or other similar matters, it will be found that a longer time will be required than would otherwise be the case. Another point of some importance is the frame of mind in which a patient comes under the influence of this anæsthetic. If an effort be made to go over quietly, there is little chance of much struggling or involuntary restlessness. On the other hand, where a patient, especially in the case of all minor operations, entertains the belief that, under the influence of anæsthetics, the conduct is necessarily outrageous, it seldom fails that such an idea is practically realized. Indeed, in not a few instances it would almost appear as if the patient had premeditated the display sometimes made during the exhibition of such agents; and in all cases it is advisable that the patient should be instructed to remain as quiet as possible, so long as sensibility is retained. In this way, with a little effort on the patient's part, the whole

operation may be rendered much more satisfactory both to himself and the surgeon.

The mode of exhibiting the anæsthetic agent has been a subject of considerable discussion, and this is a point of some importance in dental surgery. For the exhibition of ether or choloroform various forms of inhalers have from time to time been brought forward, as preferable to exhibiting the anæsthetics in a napkin or handkerchief. It must be kept in mind, however, that the less we have to attend to besides the patient, the less risk there is of danger; whereas, if attention has to be bestowed on the working of an apparatus, complicated as these inhalers occasionally are, it necessarily interferes with that close watching of the patient which is in all cases absolutely essential. Another circumstance rendering any extra complication in the inhaler objectionable, is the frequency with which the inhalation sometimes requires to be suspended and renewed. This especially applies to protracted operations on the mouth and in its neighborhood, as, for instance, in the extraction of a number of teeth at a time, where the patient becomes conscious during the operation, and requires an additional dose of the anæsthetic to be administered, while perhaps the position of the head and the condition of the mouth would render certain forms of special apparatus difficulty to adjust, not to speak of the flow of blood rendering them dangerous.

The safest and the easiest position for the patient in the case of ether or chloroform is, as has been already said, that of so reclining on a couch or sofa, that the operator may have free access to the parts requiring operation.

It is seldom before, and generally after, the accession of insensibility, that sickness with vomiting is produced by anæsthetics; and it is only when it commences before or at this stage that it forms anything like a serious impediment to the surgical procedure, as, after this is effected, its occurrence is of but little consequence. It is superfluous to say that of all operations those on the mouth and in its vicinity are such as are most interfered with by vomiting. In this way it becomes a complication of a most troublesome nature to the surgeon. But it by no means rests here; for it also entails most serious risk to the patient, inasmuch as in many cases there results from this cause very great danger of suffocation. The vomit-

ing, when anæsthesia is deep, often seems to be defective—the contents of the stomach gurgling up into the mouth, in small quantities at first, and, with the mouth widely opened, as it might inadvertently be kept during such operations, there is an inability either to swallow or to eject the vomited matters.

Nitrous oxide, or what is more familiarly known as "laughing-gas," is an anæsthetic now more largely employed in dental operations of a short duration than either chloroform or ether. Its exhibition is somewhat more complicated in its details, and the insensibility induced by it of a much more transient nature than these agents, and seldom lasting for more than about half a minute in its full effect. It is not, like the others, a fluid, but a gaseous compound, although under great pressure it can be reduced to the liquid state, in which, for the sake of portability, it is generally stored or carried about. The mode of its exhibition is through a face-piece, covering the nose and mouth, and connected by a tube with a bag containing the gas. The tube is provided with a stop-cock, by which the supply of gas can be turned on or shut off by the operator, while the bag is provided with a similar apparatus connecting it with the reservoir of gas, which generally contains it in the liquid state. The whole apparatus, including the iron reservoir containing the gas, is to be had, ready for use, at the various dental depots throughout the country. In employing this anæsthetic, the same conditions and precautions mentioned as important in the use of other anæsthetics are necessary to be observed. Owing to the brief continuance of the anæsthesia induced, it is here necessary, in order to lose no time in operating, to introduce a gag between the patient's jaws previous to commencing the administration of the gas. These gags are provided in pairs along with the rest of the apparatus, and are generally connected together by a piece of cord, partly to facilitate their use and partly to guard against danger should the one placed between the jaws accidentally slip into the patient's mouth. The face-piece being adjusted in position, and moulded to the cheeks and other parts of the face, and kept there by such pressure as will exclude the access of all atmospheric air, the gas is turned on. Here the exclusion of atmospheric air is indispensable, while in other anæsthetics this would be fraught with danger. After from thirty seconds' to two minutes' inhalation of the

gas, insensibility should be completed, and a longer time than this being required indicates the exercise of increased caution. Various modes of ascertaining when full insensibility is induced have been recommended. The fixed appearance of the eye on opening the eyelids; the non-response of the patient to a request to raise the hand; a peculiar change in the mode of breathing, and allied to a stertorous character of respiration, along with the general impression of unconsciousness conveyed by the patient to the operator, may all be taken as affording the cue to the time for commencing the operation, which should now be proceeded with as rapidly as possible. Very frequently, during its progress, the patient appears to recover consciousness, and indicates a feeling of pain or alarm, but, as a general rule, on complete recovery nothing of this kind is remembered. Sometimes a feeling of extreme prostration, or sickness, or headache follows the use of this anæsthetic, and in certain instances the patient feels the consequences of the gas, more or less, for the whole day after its administration. There is no doubt that in successful cases this anæsthetic is more convenient in many ways, both to the patient and the operator, than the other anæsthetics here alluded to, and in a certain sense it is safer; but it must not be supposed to be exempt from danger. Its timely withdrawal, and the speedy recovery from its effects in healthy patients, not too young or too old, reduce the dangers it might entail to a minimum as an anæsthetic, since it does not seem to leave any toxic material in the system, and which requires to be got rid of, as is the case with chloroform, ether, and the like, but simply requires the readmission of oxygen to the blood to effect recovery. But let its administration be a very little too much prolonged, or let the patient be the subject of certain unhealthy conditions of the lungs or blood-vessels, where any occurrence approaching stasis or congestion would be contra-indicated, and untoward or fatal results may, in any case, occur. The appearance of the patient under the influence of nitrous oxide, in nearly every instance, manifests the existence of considerable venous congestion, and the mode of action of the anæsthetic in replacing the oxygen ordinarily taken up by the blood from the air during respiration, without conveying any of its benefits, point to its influence being closely allied to the nature of asphyxia, with the characteristic distention of the heart and

great vessels. In this way it will be seen that the existence of atheroma, a tendency to hæmoptysis, degeneration of the ventricular walls, and such like conditions might, during the exhibition of nitrous oxide, incur extreme risk, and that, too, without necessarily manifesting itself at the moment of its administration.

From what has been said it will be seen that nitrous oxide is not an anæsthetic likely to be available to any great extent by the ordinary medical practitioner in the cases of dental surgery coming under his care. The combination of that anæsthetic, again, with others, such as ether, and the more complicated apparatus required in this case, are still less fitted for his requirements, being more adapted for the operating rooms of practitioners who have made dental surgery their special branch of practice. These latter, then, along with various agencies from time to time introduced as anæsthetics, but which have as yet not come into general use, need not be discussed in this place, as those given seem, in the mean time, sufficient for the cases of dental surgery in which the general medical practitioner is more frequently called upon to operate.